Structural Realism (SR) is meant to be a substantive philosophical position concerning what there is in the world and what can be known of it. It is realist because it asserts the existence of a mind-independent world, and it is structural because what is knowable of the world is said to be its structure only. As a slogan, the thesis is that knowledge can reach only up to the structural features of the world. This chapter unravels and criticises the metaphysical presuppositions of SR. It questions its very possibility as a substantive – and viable – realist thesis.

7.1 The upward path

Let the ‘upward path’ to SR be any attempt to begin from empiricist premises and reach a sustainable realist position. Arguing against the then dominant claims that only the phenomena (‘the world of percepts’) can be known and that, even if they exist, their ‘objective counterparts’ are unknowable, Russell (1919, 61) suggested that ‘the objective counterparts would form a world having the same structure as the phenomenal world, (a fact which would allow us) to infer from the phenomena the truth of all propositions that can be stated in abstract terms and are known to be true of the phenomena’. In Russell (1927, 226–7), he stressed that only the structure, that is, the totality of formal, logico-mathematical properties, of the external world can be known, while all of its first-order properties are inherently unknown. This logico-mathematical structure, he argued, can be legitimately inferred from the structure of the perceived phenomena (the world of percepts). Since this inference is legitimate from an empiricist perspective, the intended conclusion, namely, that the unperceived (or unobservable) world has a certain knowable structure, will be acceptable too. How is
this inference possible? Russell rested on the (metaphysical) assumption that differences in percepts are brought about by relevant differences in their causes (stimuli). This is a *supervenience principle*: if two stimuli are identical, then the resulting percepts will be identical. I call this the ‘Helmholtz–Weyl’ principle, for it was Hermann Helmholtz who first enunciated it: ‘we are justified, when different perceptions offer themselves to us, to infer that the underlying real conditions are different’ (quoted by Weyl 1963, 26). Hermann Weyl endorsed it because he thought it grounded the possibility of knowing something about the ‘world of things in themselves’. Yet, what is known of this world via the Helmholtz–Weyl principle, Russell (and Weyl 1963, 25–6) thought, is its structure. For if we conjoin the Helmholtz–Weyl principle with a principle of ‘spatio-temporal continuity’ (that the cause is spatio-temporally continuous with the effect), Russell (1927, 226–7) said that we can have ‘a great deal of knowledge as to the *structure* of stimuli’. This knowledge is that ‘there is a roughly one-one relation between stimulus and percepts’, which ‘enables us to infer certain mathematical properties of the stimulus when we know the percept, and conversely enables us to infer the percept when we know these mathematical properties of the stimulus’ (ibid.) The ‘intrinsic character’ of the stimuli (i.e., the nature of the causes) will remain unknown. The structural isomorphism between the world of percepts and the world of stimuli isn’t enough to reveal it. For Russell, this is just as well. As he also points out: ‘(…) nothing in physical science ever depends upon the actual qualities’ (ibid., 227). Still, he insists, we can know something about the structure of the world (cf. ibid., 254).

There may be good reasons to doubt the Helmholtz–Weyl principle (e.g., that the stimuli overdetermine the percepts). But even if we granted it, the Russellian argument that we can have *inferential* knowledge of structural isomorphism between the world of percepts and the world of stimuli requires a minor miracle. The Helmholtz–Weyl principle is not strong enough on its own to generate the required isomorphism. The determination it dictates is one-way: same stimuli, same percepts. The establishment of isomorphism requires also the converse of the Helmholtz–Weyl principle – viz., same percepts, same stimuli. Precisely because Russell doesn’t have the converse principle, he talks of ‘roughly one-one relation’. Yet, he has failed to motivate the claim that the relation should be 1–1. (Why can’t the same stimuli produce different perceptions at different times, for instance?) Besides, does it make good sense to talk of ‘roughly one-one relation’? Either it is or it isn’t one–one. If it is, we have structure-transference. But if it isn’t, we don’t.